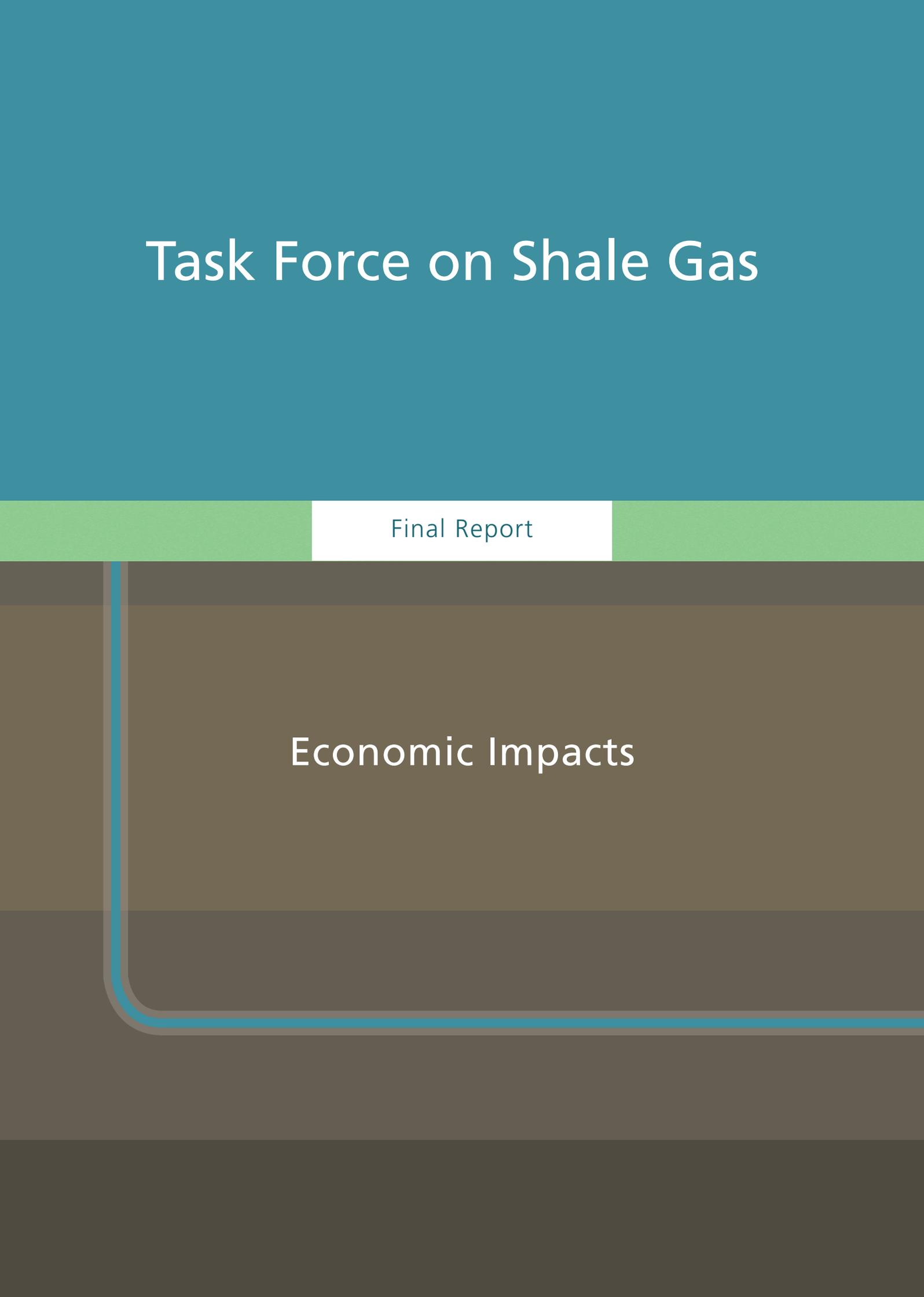


Task Force on Shale Gas

Final Report

Economic Impacts



Letter from The Panel

Once again, thank you for your interest in the work of the Task Force on Shale Gas as we continue to examine the key issues surrounding the creation of a shale gas industry in the United Kingdom. This is our fourth and final report. It examines the potential economic impacts on the UK of a shale gas industry and then makes our final recommendations and conclusions on whether the UK should proceed with developing a shale gas industry.

The entire Panel would like to thank our esteemed advisors, whose counsel and guidance continues to be invaluable.

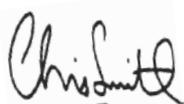
The publication of our third report, which looked at climate change impacts associated with shale gas exploration and production, continued the discussion and debate that began with our earlier reports on planning and regulation and local environmental impacts. It has always been the Task Force's view that our reports and findings must provide a useful addition to the debate over shale gas. We believe that thus far they have and we hope that with the publication of this final report will continue to do so.

Everyone has a right to make their own personal decision on the issue of shale gas on the basis of trusted and factual information. The guiding principle of the Task Force remains to provide that information.

As with each of our previous reports, the Panel is indebted to the many businesses, academics and associations who have given up their time to meet with us. They have provided a huge amount of value to our work through their knowledge and insights. All recommendations and conclusions, of course, are the Task Force's alone.

We remain open and transparent around our funding, the people and organisations that we meet, the information and academic literature that we have reviewed and consulted, and the timetable that we are working to.

All of this information, as well as each of our previous reports, is available on our website – www.taskforceonshalegas.uk – along with relevant contact details.



Lord Chris Smith
Chair



Emma Duncan
Panel Member



Professor Ernest Rutter
Panel Member



Professor Nigel Brandon
Panel Member

Acknowledgements

We would like to thank all the people and organisations who have contributed information and their perspectives to this report through the submission of evidence to the Task Force by email or through the website.

In addition, we would like to thank all the people and organisations that we have worked with and spoken to during the drafting of this report. Our particular thanks go to Dr Julio Friedmann and David Mohler from the United States Department of Energy, Professor Anne Robertson, Professor Richard Davies, Dan Sadler, Tony Almond, Ken Cronin and Corin Taylor.

Our thanks also go to representatives of local communities in Lancashire and Sussex villages, including Marcus Adams, Dr Petra Billings, Cllr Ian Campbell, Denise Campbell, Keith Charman, Mike Damms, Pat Davies, Jean Diggens, Simon Diggens, John N. Diggens, Gayzer Frackman, Rob Green, John Hodson, Neil Jack, Cllr Mike King, Gary Lovatt, Christina Maude, Babs Murphy, Laurence Rankin, Gordon Smith, Martin Spurrier, Dr Jill Sutcliffe, Michelle Taylor, Eric Vaughan and Elizabeth Warner.

We would also like to thank all those that met and hosted Lord Smith, including Dr David Joffe, Matthew Bell, Rhian Kelly, Michelle Hubert. We would also like to thank Jean-Louis Schilansky, Miles Kitcher, Victoria Merton, Peter Brown, Professor Paul Cosford, Roy Franklin, Professor Robert Mair, Dr Andrew Buroni, Dr Tim Stone, Stephen Bowler, Donald Dobson, Dr Lesley Rushton, Matthew Whitney, Professor Tim Wheeler DL, Paul Vernon, Garfield Southall, Professor Joseph Howe, Charlie Woodcock, Jenny Banks, Penny Evans, Sue Ferns, Philip Pearson, Professor Nick Butler, Professor Mike Bowman, Derek Blackwood and Geoff Davies.

Finally, we particularly wish to thank our advisors, Michael Holgate, Stephen Tindale, James Taylor, Professor Sarah O'Hara, and Dr Robert Ward for giving their perspectives on this report as it was developing. Responsibility for its contents, however, remains entirely with the Task Force Panel.

Introduction

The Task Force on Shale Gas was launched in September 2014 to provide an impartial, transparent and evidence-based assessment of the potential benefits and risks of shale gas extraction to the United Kingdom.

The Task Force's funding comes from businesses involved in the shale gas industry. However, the Task Force operates independently from its funders and the funders have no influence over its research, recommendations or publications.

The Task Force recognises that the issue of shale gas extraction and its potential benefits and risks to the UK has become a polarising topic in the UK. As such, it is difficult to find a platform for reasoned debate about shale gas extraction.

The mission of the Task Force is to create that platform, to provide reasoned and evidence-based conclusions and recommendations to both industry and Government about the potential of shale gas extraction in the UK, to inform the general public and to promote reasonable discussion about these findings.

To make this possible we decided to deal in detail with clusters of issues over a series of reports, enabling us to publish our conclusions at the earliest possible time.

Our first interim report, published in March, examined the existing planning and regulatory system for shale gas and the public consultation process. We made a series of recommendations that we believe would address reasonable concerns raised by the public around potential shale gas extraction. This report also contains what is hopefully a useful guide to the current political context around shale gas in the UK and an introductory guide to what shale gas exploration and extraction in the UK would consist of and how this would differ from much publicised shale gas operations in the United States.

Our second interim report, published in July, looked at the impacts of shale gas associated with the local environment. Specifically it looked at seismic activity, at potential impacts on air and water and on public health impacts. The Task Force made a series of recommendations that we believe would provide a framework under which it would be possible to minimise the risk associated with shale gas to acceptable levels.

Our third interim report, published in September, examined and assessed evidence related to the potential climate change impacts associated with shale gas. This report concludes that, provided it is firmly regulated, shale gas can contribute to the decarbonisation of the British economy. Each of these reports is available in full on our website.

This is our fourth and final report, which will examine the economics of a shale gas industry in the UK – including community benefits and compensation.

The conclusions drawn by the Task Force in each report, and the resulting recommendations, reflect the views of the Panel only. They do not necessarily reflect the views of any of the organisations we have met or advisors we have consulted. They are drawn by the Panel from a combination of academic review, personal meetings, interviews and site visits.

Economic impacts of shale gas

- Our starting point

In order to understand the economic impact on the UK of a shale gas industry, the Task Force has explored the issue at a global, national and local level.

In particular the Task Force sought to answer the following questions:

- What economic impact would a UK shale gas industry have globally and in the European market particularly?
- What are the potential positive or negative impacts of a shale gas industry for the domestic economy, in terms of jobs, skills and revenues?
- What are the potential positive or negative impacts of a shale gas industry for local economies, in particular those communities living in the immediate vicinity of any shale gas operation?
- To what extent will the development of a domestic shale gas industry improve the UK's energy security?

In addition, what has become apparent over the course of our research for this particular report is the extent to which it is very difficult to make predictions about a potential shale gas industry as a result of the lack of clarity and information available about how much potential there is and how any industry might develop.

Therefore as we have developed our analysis we have also tried to make recommendations where we believe more clarity is needed – and should be achievable.

International impacts of a UK shale gas industry

American and European gas markets

The United States has led the world in producing natural gas from shale, as discussed in previous Task Force reports. As such it provides a useful starting point from which to understand the economic implications of shale gas production for consumers.

The American energy market is relatively closed. In 1975, the US introduced the Energy and Policy Conservation Act (EPCA) which granted the President authority to restrict exports of coal, petroleum products, natural gas, petrochemical feedstocks and supplies of materials and equipment for the exploration, production, refining and transportation of energy supplies. (The President was also, however, authorised to exempt crude oil and natural gas exports when doing so was deemed to be in the national interest.)

This meant that when gas production in the US increased, the country was not able to export it. Suppliers could not sell their product abroad and therefore sold

it domestically, causing prices to fall. As a result the American gas price, known as "Henry Hub", fell behind the European benchmark price, called the "UK National Balancing Point".¹

Today, through modification of the EPCA, the US allows unrestricted exports of coal, petroleum products and petrochemical feedstocks. It also allows the export of natural gas on a case-by-case basis. For those countries the US does not hold a Free Trade Agreement with, the Department of Energy must issue a permit.

More recently, there has been speculation that the available gas exports from the US are set to grow significantly. In April this year, US

Energy Secretary, Ernest Moniz, said, *"We anticipate becoming big players, and I think we'll have a big impact. We're going to influence the whole global LNG market."*²

There are no barriers to trade in natural gas within the European Union. The EU also has an extensive network of pipelines for transporting natural gas. Therefore gas prices within the EU remain relatively similar, and the EU market would have a buffering effect on UK shale gas prices should an industry develop.³

Energy security

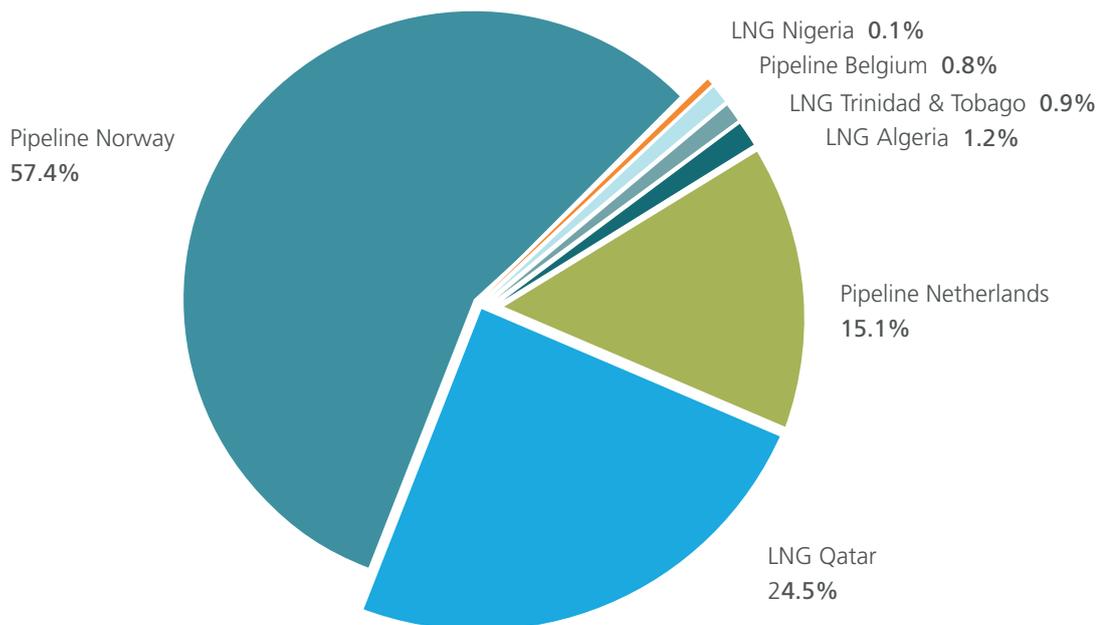
Supporters of developing a shale gas industry in the UK, including the Government, argue that a key benefit would be to improve the nation's energy security – the uninterrupted availability of energy sources at an affordable prices.

For this to be the case then the development of a national industry must be more secure than sources from where gas is currently imported.

The UK currently produces enough gas from the North Sea and the Irish Sea to meet almost half its needs (43%).

However, Britain's gas fields are depleting, meaning the shortfall in supply will need to be made up elsewhere. The rest is imported – in large part from European and Norwegian pipelines (44%), as well as from LNG tankers (13%).⁴

Fig.1. Sources of UK gas imports in 2014⁵



The UK Government has emphasised that it believes that shale gas has a role to play in improving energy security. Energy and Climate Change Secretary Amber Rudd said: *"We need more secure, home grown energy supplies – and shale gas must play a part in that."*⁶

For this to be the case the development of a national industry must be more secure than sources from where gas is currently imported. However, the scope for further production inside the EU is limited. In the Netherlands there are concerns about the carbon emissions associated with gas burning, and there has been heightened public concern about gas following a series of minor earthquakes associated with the depletion of the Groningen conventional gas field.⁷

North Africa, beset by terrorist threats and civil unrest, has proved an unreliable supplier. Gas supplies from Libya (once a reliable supplier) and Algeria (where local demand is booming) are both in decline.

The security of gas supply has been a priority in the EU since Russia cut off gas deliveries to Ukraine in 2006 and 2009. In 2013 the EU imported 305 billion cubic metres (bcm) of natural gas – 66% of its consumption. Russia supplied 39%

of EU gas imports by volume, Norway 33% and North Africa (Algeria and Libya) 22%.⁸

The EU has the capacity to import more LNG, but supply is inelastic. Most producer countries are operating at full capacity and although there is potential for increased output by the US, growing demand for LNG by significant consumers such as China and Japan is pushing up prices. LNG supplies are also more vulnerable to geopolitical uncertainty whereas a domestic shale gas industry would not be.⁹

There are also other reasons to believe that the creation of a domestic shale-based industry would be preferable to higher imports. As the Task Force concluded in its third report on climate change, the processing of gas and transport by ship from wherever it comes must add unnecessarily to the energy cost of transportation. As with all imports, purchasing gas from abroad also contributes adversely to the balance of trade figures for the UK.

Indeed, domestically-sourced energy plays a significant role in improving the UK's balance of trade. According to the 2010 Oil and Gas UK Economic Report, the deficit in the trade of goods and

services would have almost doubled from £32 billion to £59 billion had it not been for oil and gas produced in the UK.¹⁰

The Task Force has previously concluded that natural gas will play a significant part in the UK energy mix for several decades and will continue to be a vital feedstock material for the chemical industry. It therefore believes that the development of a shale gas industry in the UK will improve the UK's energy security, and that this must be seen as a major driver for the development of the industry.

Within Europe, the UK is well placed to take the lead in developing the industry and in the application of the latest regulations and technology. The internal European market for gas means that Europe as a whole would benefit from the reduction of UK gas imports and the enhancement of UK energy security.

Impact of UK shale gas on European and UK gas prices

It is likely that the emergence of a shale gas industry in many countries worldwide might reduce natural gas prices. In the US this occurred largely because the gas produced had to be sold and consumed locally. However, it seems that the impact of a shale gas industry in the UK alone would not be sufficient to reduce prices in Europe.¹¹

This is because the UK's shale gas output is likely to be small in comparison to the size of the European market. Similarly, the EU's combined shale gas industries are unlikely to have a large impact. The EU's Joint Research Centre estimates Europe's technically recoverable unconventional-gas

resource at 11,700bcm, about 25% of America's. However, a lack of drilling and exploration mean that European shale reserves are, as yet, untapped. At current rates, IHS predicts European shale production will have only reached 4bcm a year by 2020, compared with over 70bcm in America today.¹² Meanwhile conventional gas production in Europe could fall by ten times that amount over the same period. At the same time, as discussed above, it appears likely that the US will begin to export gas in the form of LNG and this may also have an impact on prices in Europe.

“The EU’s Joint Research Centre estimates Europe’s technically recoverable unconventional-gas resource at 11,700bcm, about 25% of America’s. However, a lack of drilling and exploration mean that European shale reserves are, as yet, untapped.”

Domestic economic impacts of shale gas

United Kingdom recovery rates

A range of estimates have been made of how much shale gas the UK could produce. The total amount of shale in place is well known and also the distribution of depths at which the deposits lie, but not all shale deposits are equivalent. They vary in their organic matter contents, liquid saturation, degree of pre-existing fracturing and geomechanical properties.

This leads to immense spatial variations in the likely gas content and the relative ease or cost of extracting it. Before the costs and amounts of gas in place that can be recovered can be reliably estimated, it is essential to accumulate information and experience by drilling and testing many exploration wells in many places.

An industry-funded Institute of Directors (IoD) report in 2013 estimated that an annual gas production of between 853bcf (24.2 billion cubic metres) and 1,389bcf (39.3 billion cubic metres) might be achieved in the UK. This is a level of production approximately equivalent, for example, to that of the US state of Arkansas, which produced 1,026bcf (29 billion cubic metres) in 2013. The report states that, as a result, the proportion of natural gas requirement that must be imported to

the UK could fall from 76% to 37% in 2030.¹³ An Ernst & Young (EY) report on UK shale gas potential did not offer an estimate, stating instead: *“It is not yet possible to make any forecast of potential recovery rates”*.¹⁴

This is the crux of the problem when considering the economic positives and negatives associated with the creation of a shale gas industry in the UK. The recoverable gas in place, the likely production rate and associated costs dictate the potential size and competitiveness of the industry. Many of the direct benefits to the UK – in terms of jobs, skills and infrastructure development – are directly relatable to these factors. Likewise if community benefits are linked to production, it becomes difficult for communities to understand the amounts of any benefits they may receive. To this end it

appears increasingly evident to the Task Force that the government and local communities should make more of an effort to allow initial, exploratory wells to be established in order to be able to make reliable estimates of recoverable gas in place and potential production rates. Without such information operators cannot make the economic decisions that might lead to the development of a viable industry.

The size of the UK industry's impact will depend on its (as yet unknown) potential output. We recommend that a number of exploratory wells should be allowed to go ahead, under the very strict environmental safeguards that we have outlined in our previous reports, in order to establish a much clearer picture of where and how much recoverable gas there is in the UK.

Employment creation from shale gas development

There have been a number of studies published which have focused on job statistics, notably in the reports outlined above by the IoD and EY. The estimated number of new jobs created ranges from 74,000 for the whole industry to 5,333 in the Northern economy, without a supply chain hub.

The IoD report estimates that a shale gas industry would create 74,000 jobs including direct, indirect and induced jobs – and attract investment of almost £3.7 billion each year. The EY-produced report, sponsored by United Kingdom Onshore Oil and Gas (UKOOG) and based on the IoD findings, concluded that shale gas development in the UK would lead to £33 billion in investment over 15 years and could create up to 64,000 jobs in total.

The Task Force has considered that, rather than relying on hypothetical figures, it would be more useful to examine an area where a shale gas industry has been created and for which reliable statistics are available, and to examine the impact on job creation in that area.

There are four significant shale gas states in the US. They are Texas, Arkansas, Louisiana and Pennsylvania. It is difficult to make like-for-like comparisons with the UK for a number of reasons, one of which is population density. The UK is around 7.5 times more densely populated than the US.

However, Pennsylvania makes a useful comparison with the UK for several reasons. Most notably it has the most highly developed analysis and evidence available on job creation. This is because the state's Department of

Labor and Industry and the Multi-State Shale Research Collaborative (MSSRC) have produced regular reports on shale job figures for several years.

Shale deposits in Pennsylvania cover approximately three times the area that they do in the UK.

According to the Pennsylvania state Department of Labor and Industry 33,137 people are employed directly in oil and gas jobs.¹⁵

For comparison, employment in oil and natural gas extraction and support activities in the US reached nearly 538,000 in October 2014, but then it declined by about 35,000 jobs, or by 6.5%, over the following six months, through April 2015, according to data from the U.S. Bureau of Labor Statistics (BLS).¹⁶

To estimate that number in Pennsylvania, the Department counted workers in these six “core” industries:¹⁷

- **Crude petroleum and natural gas extraction**
- **Natural gas liquid extraction**
- **Drilling oil and gas wells**
- **Support activities for oil and gas operations**
- **Oil and gas pipeline and related structures**
- **Pipeline transportation of natural gas**

In June 2015, the Department changed how it counts jobs. It still uses figures from those six core oil and gas industries, but it now relies on an

economic modelling software program called IMPLAN (Impact Analysis for Planning) to calculate the indirect jobs effects. The agency now attributes 89,314 jobs to the gas industry.

Previously, the Department had published a monthly booklet called Marcellus Shale Fast Facts.¹⁸ It showed the direct jobs in the six core industries, as well as about 200,000 workers in 30 other “ancillary” industries. This number captured everyone in those industries– including every road construction worker, trucker, engineer, and steel worker in Pennsylvania. Those perceived to be supporting the industry often combined the two figures (core and ancillary) and credited the Marcellus Shale with supporting 250,000 jobs state-wide. Independent economists questioned such estimates.

In December 2014, the Department of Labor and Industry reported that just over 31,000 people were employed in the state's oil and gas industry. That figure was higher than the federal data indicates. But the Department attributed another 212,000 jobs to shale development by adding employment in 30 “ancillary” industries.

In Pennsylvania, the Multi-State Shale Research Collaborative (MSSRC) report on shale employment in the Marcellus region found that shale development accounts for one out of every 249 jobs, while the education and health sectors account for one out of every six jobs (for comparison).¹⁹

Economists concur that attributing two additional jobs to every one directly created in an industry is generous. By comparison the Commonwealth of Pennsylvania attributed seven additional jobs to each one created in the oil and gas industry. Depending on how broadly one defines the State's oil and gas industry, between 5,400 and 31,000 people were employed in Pennsylvania in 2012. A generous estimate would be 30,000 to 60,000.

The MSSRC report demonstrates that less than 1 per cent of jobs in the various ancillary industries could be related to shale development activities. Further, Pennsylvanian employment in these industries overall changed little before, during, and after the shale boom.

In seeking to maximise the beneficial employment impact of a shale gas industry, it will be crucial to ensure that a wider spread of existing industries will be able to support a nascent shale gas industry. This issue was examined in the EY report, which recommended:

- **UKOOG should work with the supply chain components to gain a common understanding of requirements, identifying in particular research and development needs**
- **Expanding the Fabricators' Directory to include detailed specifications of components required for onshore shale development and to promote UK suppliers domestically and abroad**
- **Capitalising on existing government schemes such as the Manufacturing Advisory Service to raise awareness of the supply**

chain opportunities for existing businesses

- **That the government, UKOOG and supply chain firms work together to build an investment case for the development of UK-based capabilities, including recommendations of bridging finance options**
- **Innovate UK to identify where there are opportunities to develop and deploy new technologies**
- **Government to review early stage financing options, including inward investment**

In the Autumn Statement in 2013, Prime Minister David Cameron confirmed that the Government would provide a fiscal incentive and halve the tax rate on early profits of shale gas.²⁰

EEF, the manufacturers' organisation, concluded in its report that the creation of manufacturing jobs in the UK would be largely limited to those directly or indirectly linked to the shale gas industry and possibly the petrochemicals sector. The organisation called for longer-term thinking to develop UK skills to an extent that the nation will be able to export expertise and equipment to supply a global shale industry. To make this possible the EEF called for the development and enhancement of UK domestic resources, a skills base and making a strong business case for investment in manufacturing capabilities.²¹

The Government has already taken steps towards developing skills associated with the potential development of a shale gas

industry. In November 2014 the first national UK shale colleges were announced. The National College for Onshore Oil and Gas will be headquartered in Blackpool and linked to colleges in Chester, Redcar, Cleveland, Glasgow and Portsmouth.

The Government will provide £750,000 of development funding which will be matched by industry bodies and education providers to develop the College. Further capital funding will be available from the National College programme to support the college on an industry-matched investment basis.

The National College will provide high-level specialist skills needed by the industry, from A-level equivalents through to post-graduate degree level, as well as train teachers and regulators and accredit relevant training and academic courses run by other institutions and conduct research aimed at improving materials, equipment and processes of the industry – specifically to reduce the environmental impact of operations. Other major universities, that already provide high-level trained personnel to the conventional hydrocarbon industry, will also rise to the challenge of meeting the needs of the new industry, the Task Force believes.

Our conclusion is that the development of a shale gas industry would provide substantial employment for the UK. However it will not be possible to ascertain an accurate estimate of the scale of this opportunity until we have a clearer idea of the amount of recoverable gas. For this reason it makes sense for exploratory drilling to begin so that a clearer decision can be made.

Impact of shale gas operations on other industries

The creation of one industry has the potential to impact on others. Several industries have the potential to benefit from a successful shale industry, as has happened in the US, for example. It is worth noting that as above, export restrictions on US energy mean that domestic shale production has brought prices down much more than a UK domestic shale industry would bring prices down in the UK. No doubt locally available gas supplies would be a bit cheaper than imported ones because of lower transport costs; nevertheless, any price reduction would be less than in America, and so the benefits to local industry would be less.

The success of the shale gas industry in the US has had a dramatic knock-on effect to the nation's chemical industry. The American Chemistry Council (ACC) credits the shale industry with releasing cheap natural gas and natural gas liquids (NGL) such as ethane, which have revived the US chemicals industry.²² The impact has been to decrease the costs of both raw materials and energy – and this has led to significant “onshoring” – as in bringing jobs back to the US. This in turn has had an impact on supply chain industries. The ACC found that:

- **Gross exports of shale gas-derived chemical products will double from \$60 billion in 2014 to \$123 billion by 2030**
- **Trade surplus for selected chemicals is projected to increase from \$19.5 billion in 2014 to \$48.3 billion in 2030**
- **US chemical companies have begun or are planning 223 shale-related projects to date, representing a cumulative investment of \$137 billion**

A report by the University of Michigan concluded:²³

“More than 200 mostly US-based companies have participated in onshoring during the past four years, a trend in part motivated by the availability of less expensive natural gas. One Fall 2013 survey of executives of companies cumulatively valued at \$1 billion-plus stated that over half of those are either already planning for or actively considering moving production back to the US from China.” This trend in US companies may also have adverse effects on UK industries.

The US fertiliser industry is experiencing its fastest growth in 25 years, largely due to the growth of the shale gas industry. Natural gas is used to produce ammonia, which serves as the primary ingredient in most nitrogen-based fertilisers and is an essential ingredient in many finished phosphate fertilisers. The abundance of natural gas as a result of the shale gas explosion in the US has meant that the domestic fertiliser industry has experienced significant cost reductions. CF Industries, a major manufacturer and distributor of fertiliser products in the US reported a more than three-fold increase in the gross margin of its nitrogen-based segment from 2009 to 2011.²⁴

Another industry that could benefit from the growth of a domestic shale industry is the steel industry; currently the UK steel industry is very sensitive to economic conditions. As steel is used to manufacture the well casings that are required for exploration and production wells, the potential impact on the steel industry could be large. Each gas well requires 6 or 7 km of steel casing pipe to be placed underground. A fully developed industry would require many thousands of km of steel pipe over a period of more than 10 years.

“Several industries have the potential to benefit from a successful shale industry, as has happened in the U.S...”

Opponents of shale gas argue that the growth of an industry could have a significant negative impact on industries such as hospitality and tourism.

The concerns about tourism are articulated in a downbeat report by Rumbach that examines the potential impact of drilling on the areas overlying the Marcellus shale field: *"The regional industrialization associated with widespread drilling could do substantial damage to [a] region's brand, threatening the long-term growth of tourism... Increased truck traffic, automotive traffic, air pollution, noise pollution, and industrial accidents, decreased availability of hotel/motel rooms, campground spaces, and RV parking, negative visual impacts from multiple drilling rigs in rural view-sheds, storage facilities, gravel pits, and compression stations, disruptions to wildlife and hunting grounds, fears over lake and stream pollution and many other associated impacts of drilling will change the character of the region from pristine and rural to gritty and industrial."*²⁵

"...there is no evidence to suggest that shale gas operations should be treated any differently to comparable industrial operations."

The counter-argument to this position, however, is that the wider hospitality sector may benefit from workers coming to the area to service the new industry and this was the impression firmly conveyed to the Task Force by local government officials during its visit to Pennsylvania in Spring 2015 to investigate the impact of the growth of the industry there.

The Task Force is confident that the impact on tourism can be mitigated and minimised. The current regulatory system, which can make recommendations regarding vehicle movements and hours of operation,

which could potentially impact on tourism, is well-suited to perform this function. Beyond this there is no evidence to suggest that shale gas operations should be treated any differently to comparable industrial operations.

Local economic impacts of a UK shale gas industry

Private property values

As the Task Force travelled the country and met with residents in local communities with the potential to be impacted by any new shale gas operations, it has been clear that a perceived negative impact on property values is a key source of concern.

There are two possible impacts here. The first is the impact on private property values and the second is the impact on the availability of living spaces, for example homes to purchase and hotels/guest house rooms.

The most comprehensive study of the impact of shale gas extraction on property values used the transaction records of data from all houses sold in 36 counties in Pennsylvania and 7 counties in New York between 1995 and 2012.²⁶ The authors established three main categories of impact. These were:

- (a) Adjacency effects, which means the stressful impact associated with the effects of living next to the operations, but excluding any effects of groundwater contamination, or noise or the potential of receiving community benefits.
- (b) Groundwater contamination risk was identified as a category

by itself – meaning the perceived risk to a house-owner of having a shale gas well drilling near to its groundwater source. (Note however that the Task Force has examined the potential for groundwater contamination in detail in its second interim report). Furthermore, given the extremely low number of people in the UK with their own groundwater source, it can be said that this category is not as relevant in the UK as it is in the US.

- (c) Vicinity effects stand for the impacts on the wider region of having shale gas operations in an area, for example through busier roads or elevated air pollution levels. Again, the Task Force has examined potential air pollution in its second interim report, which is available to read on our website.

The authors found that properties situated within 1.5 km of a gas well went up in value by 6.6 per cent. This was driven by royalty payments, or the perception that royalty payments would be made. Currently, as we will discuss below, there is no equivalent mechanism in the UK which would pay royalties to householders in the vicinity in a manner similar to the US, although alternative arrangements might be made.

Finally, the authors concluded that the impact on property values in the wider vicinity would be negligible a year or more after the well had been drilled. However the initial impact is negative if a well has been given permission to be drilled, but has not yet been drilled.²⁷

Based on the above, the Task Force is led to a number of initial recommendations:

- While the findings of the Task Force's second interim report were made solely with the aim of ensuring that the risk of negative local environmental impacts was minimised – the potential for such impacts to reduce property values, even temporarily, underlines to us how important it is that those recommendations be adopted and implemented as soon as possible.
- The impact on property values of those properties affected by operations is uncertain. In the US any negative impact has been offset through royalty payments to the extent that those properties have actually increased in value. In the UK, both industry and Government must ensure that any community payment scheme (which we will discuss below) directly and appropriately assists those property owners directly affected by shale operations. However, the US experience also shows that after completion of a well pad, property values tend rapidly to recover.

A shortage of houses in a potential shale gas area can lead to higher rents as new residents come into the area to

“In the UK, both industry and Government must ensure that any community payment scheme ... directly and appropriately assists those property owners directly affected by shale operations.”

service the growing industry. For example, authors found that a typical rent for a house in Bradford County, Pennsylvania, increased from \$600 per month to \$1,200 per month, while a typical apartment rent grew from \$375 per month to \$800 per month.

Were this situation to be replicated in the UK, it could be seen as a boon to the Private Rented Sector, but would of course have a negative impact on local people looking to rent in their area.

A further factor that can potentially influence the property values in an area in which shale gas operations are developed is the perceived potential for induced earthquakes. The perception that earthquakes may happen in future can decrease house prices. The Task Force has examined the likelihood of earthquakes being caused through shale operations in its second interim report.

We concluded that, while minor tremors can always be caused by the process of subterranean fluid injection, the larger felt earthquakes that have been associated with the shale gas industry because of reports from the US were actually caused by the disposal of waste water using a method called deep injection. This commonly is carried out in areas distant from the shale gas exploitation area. We recommended as a result that this method only be used exceptionally in the UK to dispose of waste fluids in circumstances in which the consequences are well understood. We reiterate this recommendation now.

Community payments

UK property holders do not own sub-surface resources as they do in the US. Therefore community payments have been recognised as an alternative to ensure that landowners and the local community can benefit financially from any shale gas industry.

In 2013, UKOOG published the UKOOG Community Engagement Charter on Oil and Gas from Unconventional Reservoirs.²⁸ As part of this UKOOG recommended that operators:

- Provide benefits to local communities at the exploration or appraisal stage of £100,000 per well site where hydraulic fracturing takes place
- Provide a share of proceeds from the production stage of one per cent of revenues

These recommendations are supported by the Government. Operators will be required to publish evidence each year of how they have met these commitments.

In January 2014 the Prime Minister also announced *“that councils can keep 100 per cent of business rates they collect from shale gas sites – double the current 50 per cent figure”*.²⁹ It is worth noting, however, that in October 2015 the Chancellor suggested that local authorities would keep all business rates collected regardless, in return for

new responsibilities. The details of this scheme are currently being consulted on.

In the same announcement in January 2014 the Prime Minister suggested that 1 per cent of revenues could be worth £5m - £10m for a production site over its lifetime. He confirmed that industry would consult on how best to share the money with the local community, *“with options including direct cash payments to people living near the site, plus the setting up of local funds directly managed by local communities”*.

Chancellor George Osborne, in the Autumn Statement of 2014, announced a *“sovereign wealth fund”* for the north, which would invest tax payments from future shale gas extraction into the region.³⁰ Some further details were revealed in the Autumn Statement of 2015 but there remains a lack of clarity over how it will be spent and who will receive the money.

Sitting slightly outside the rest of the potential shale gas operators, in September 2014 the company Ineos announced plans to give 6 per cent of shale gas revenues to homeowners, landowners and communities living close to its wells. It is worth noting that Ineos makes its estimates based on future business rates of two per cent. Ineos estimates that it will give more than £2.5 billion from its shale gas business to local communities. It

estimates that people living in an Ineos Shale Gas Community (100km square) would typically share £375 million over the life of the project. This would see homeowners and land owners directly above wells sharing 4 per cent of the revenue, an estimated £250 million. The wider community would share 2 per cent of the revenue, an estimated £125 million. Ineos chairman Jim Ratcliffe said at the time that this proposal was *“a game changer for Britain’s shale gas industry”*.³¹

Considering the existing proposals for community payments schemes, the Task Force has been struck by the lack of clarity over exactly how payments will be collected, administered and spent, or indeed what the precise definition of ‘community’ is. This lack of clarity, in our opinion, makes it difficult for residents living near to potential shale gas operations to understand precisely how they might benefit. While the potential negative impacts in terms of noise and traffic are easily understood, the potential impact of substantial community payments is more likely to mirror the positive effects seen in the US, but the eventual impact upon the attitudes of members of local communities will become apparent only when the real details of such payments becomes clear. Community payment schemes have already been developed in connection with wind farm developments. The examples below give some insight into how these schemes operate.

Community payments examples

Below are some case studies of how community benefits gained from energy developments have been managed and/or used.

1. Carsphairn, Scotland Community Benefit³²

Developer: ScottishPower Renewables/ Onshore Wind

ScottishPower Renewables has 29 operational wind farms across the UK and to date has provided more than £11,500,000 in community benefit to the communities surrounding their windfarms. One of the recipient communities is in Carsphairn. The Parish of Carsphairn, a village in Dumfries and Galloway, Scotland is around 10 miles square in size, and currently hosts a population of around 200 people. To support the administration of funds received, the community has set up a trust to manage funds from Wether Hill wind farm and any other wind farms in their vicinity. This is Carsphairn Renewable Energy Fund Limited (CREFL). CREFL has received almost £140,000 from Wether Hill Wind farm leading to a number of projects which have helped the community to enhance the Carsphairn area.

2. Strathnairn, Scotland Community Benefits Limited³³

Developer: RWE npower renewables Limited

Following advice from The Highland Council, Strathnairn Community Council, South West of Inverness and bordering the Monadhliath Mountains, decided to set up a new, constituted community body to administer community benefit payments from RWE npower's Farr wind farm. The neighbouring Strathdearn Community Council was also involved in discussions, and the funds are split between the two groups and their relevant bodies.

Setting up the community body was supported by legal advice, funded by the community council. Solicitors examined the legal agreements from the developer and helped the community to create their own documents for the new company. Strathnairn Community Benefit Fund (SCBF) is established as a charity and a limited company, with the Strathnairn Community Council as its sole shareholder. When the company was set up, a notice was put to the community asking for volunteer directors. Interviews were conducted by the community council, and the selected directors were placed on the board of the SCBF. Further decisions were then confirmed at the AGM. Strathnairn Community Benefits is structured in such a way that it receives £716.40 per MW installed per year. Therefore each year it receives £65,908.80 .

3. Burton Wold (Burton Latimer, Northamptonshire)³⁴

Developer: Your Energy 10 turbines (20MW)

Through close consultation with the local community it was agreed that a community benefits scheme to support greater energy efficiency and options for smaller-scale renewable energy projects be developed. The community fund was therefore established to support such projects, including education initiatives related to renewables and energy efficiency. The community received a lump sum of £40,000 upon construction of the wind farm, and receives £10,000 every year over the life of the project. The fund is open to residents and community groups to apply for grants and interest-free loans to make energy efficiency improvements to their homes or premises, or for the promotion of energy efficiency education. To date, sixteen local residents are exploring opportunities for installing energy efficiency measures and renewables in their homes, with one resident already benefiting from the successful installation of a solar PV system on their property.

Summary of economic conclusions

Private property values

The Task Force concludes, based on the evidence cited above, that the emergence of a shale gas industry in the UK would create thousands of jobs for the country. However, there are caveats to this that should be addressed in order to maximise the positive impact of the creation of any industry within the UK and to reassure the public that any industry is being developed in their best interest. The Task Force concludes:

- The presently-available predictions of job creation and likely benefits to UK trade balance, of necessity made with less than ideal amounts of factual data coupled with intelligent guesswork. The Task Force urges that a sufficient number of exploratory wells be drilled, hydraulically fractured and tested under the strict and transparent conditions that we have recommended in previous reports, in order to provide everyone – industry, Government and public – with a more accurate idea of the amount of gas that is economically recoverable. Only by doing so can operators and others evaluate whether and where an industry might develop and at what pace.
- There should be greater clarity about what tax arrangements are required in order to enable a shale gas industry to get up and running. Government incentives should, rightly, be needed only for initial exploratory drilling, until an industry becomes established and self-sufficient. We believe the Government needs to be completely transparent about tax incentives such as halving the rate of tax applied to profits of shale gas and these ought to be reviewed in full if and when an industry (of any scale) is up and running, as was the case with North Sea allowances.
- The Task Force is strongly in favour of Government spending to develop skills and training programmes such as proposed by the first national UK shale colleges and to research new technologies. Skills need to be transferable.

The Task Force believes that if Government and industry are serious about establishing a significant community payments system, as we believe they are, then we recommend that as soon as possible (given that planning applications for shale gas are underway) the following is implemented:

- Operators (or UKOOG) outline exactly how they intend to provide £100,000 of community benefits for exploratory well pads. As outlined above the Task Force believes that exploratory wells are necessary to enable more accurate data on the potential for a UK shale gas industry to be collected so that operators can make business decisions. Local communities should know how they will benefit from this and where possible should have a say in how they benefit.
- For all wider community payments, the industry and Government should define exactly what is meant by “communities”. It seems clear that those properties directly affected by shale gas operations face the most disruption. As we have seen, in the United States this is countered by the expectation of royalty payments. In the UK, for example, residents living near a developing or subsequently producing well site should benefit from the revenues of that site, according to an agreed formula.
- In order to ensure maximum levels of transparency, community involvement and engagement, operators should not be left to administer community benefits payments as they see fit, neither should it be left entirely to local authorities. Agreeing a fair and robust scheme of community payments will be a complex issue, and should involve residents, local authorities and operators working together. The UKOOG Community Charter, and the pilot work that is being done alongside the UK Communities Foundation, provides a welcome start to this process. We recommend that at local level an independent committee, with members taken from residents and local authority representatives, with the operator acting as a non-voting member, and receiving advice from relevant experts, be established in communities to deal with local policies within an overarching globally-agreed framework of principles when a shale gas production site is established. We welcome that some operators have already agreed to an approach along these lines, working with local community foundations.

Endnotes

- ¹ Evans-Pritchard, A., 2015. US to launch blitz of gas exports, eyes global energy dominance. [Online] Available at: <http://www.telegraph.co.uk/finance/newsbysector/energy/11563761/US-to-launch-blitz-of-gas-exports-eyes-global-energy-dominance.html>
- ² US to launch blitz of gas exports, eyes global energy dominance, The Telegraph. [Online] Available at: <http://www.telegraph.co.uk/finance/newsbysector/energy/11563761/US-to-launch-blitz-of-gas-exports-eyes-global-energy-dominance.html>
- ³ EuroStat, 2014. Electricity and natural gas price statistics. [Online] Available at: http://ec.europa.eu/eurostat/statistics-explained/index.php/Electricity_and_natural_gas_price_statistics#Natural_gas_prices_for_household_consumers
- ⁴ Where does UK gas come from?, British Gas. [Online] Available at: <http://www.britishgas.co.uk/the-source/our-world-of-energy/energys-grand-journey/where-does-uk-gas-come-from>
- ⁵ Where does the UK currently get its gas from?, UKOOG. [Online] Available at: <http://www.ukoog.org.uk/knowledge-base/gas-uses/where-does-the-uk-currently-get-its-gas-from>
- ⁶ Faster decision making on shale gas for economic growth and energy security, DECC. [Online] Available at: <https://www.gov.uk/government/news/faster-decision-making-on-shale-gas-for-economic-growth-and-energy-security>
- ⁷ Dutch government to halt gas output in part of Groningen field, Reuters. [Online] Available at: <http://uk.reuters.com/article/netherlands-gas-groningen-idUKL5NOXB2V320150414>
- ⁸ European Parliament, Briefing December 2014, Shale gas and EU energy security. [Online] Available online at: [http://www.europarl.europa.eu/RegData/etudes/BRIE/2014/542167/EPRS_BRI\(2014\)542167_REV1_EN.pdf](http://www.europarl.europa.eu/RegData/etudes/BRIE/2014/542167/EPRS_BRI(2014)542167_REV1_EN.pdf)
- ⁹ Conscious uncoupling, The Economist. [Online] Available at: <http://www.economist.com/news/briefing/21600111-reducing-europes-dependence-russian-gas-possible-but-it-will-take-time-money-and-sustained>
- ¹⁰ Oil&Gas UK Economic Report 2010. [Online] Available at: <http://oilandgasuk.co.uk/wp-content/uploads/2015/05/EC021.pdf>
- ¹¹ Carrington, D., 2013. Lord Browne: fracking will not reduce UK gas prices. [Online] Available at: <http://www.theguardian.com/environment/2013/nov/29/browne-fracking-not-reduce-uk-gas-prices-shale-energy-bills> and Navigant Consulting, 2012. Unconventional Gas: The potential impact on UK gas prices. [Online] Available at: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/223492/navigant_consulting_report.pdf
- ¹² IHS Global Insight 2011: The Economic and Employment Contributions of Shale Gas in the United States. [Online] Available at: <http://anga.us/media/content/F7D1750E-9C1E-E786-674372E5D5E98A40/files/shale-gas-economic-impact-dec-2011.pdf>
- ¹³ IOD, Infrastructure for Business: Getting shale gas working. [Online] Available at: <http://www.iod.com/influencing/policy-papers/infrastructure/infrastructure-for-business-getting-shale-gas-working>
- ¹⁴ Ernst&Young April 2014, Getting ready for UK shale gas: Supply chain and skills requirements and opportunities. [Online] Available at: [http://www.ey.com/Publication/vwLUAssets/Getting_ready_for_UK_shale_gas/\\$FILE/EY-Getting-ready-for-UK-shale-gas-April-2014.pdf](http://www.ey.com/Publication/vwLUAssets/Getting_ready_for_UK_shale_gas/$FILE/EY-Getting-ready-for-UK-shale-gas-April-2014.pdf)
- ¹⁵ Pennsylvania Department of Labor & Industry, Employment Rates June 2015. [Online]. Available at: http://www.dli.state.pa.us/portal/server.pt/gateway/PTARGS_0_2_112172_10459_615194_43/http%3B/pubcontent.state.pa.us/publish/content/publish/cop_hhs/dli_i_i_enterprise_news__media/media_portlets/newsitems/pa_unemployment_rate_at_5_4_in_june.html
- ¹⁶ EIA, Today in Energy: Oil and natural gas production job declines tend to lag oil price declines. [Online] Available at: <http://www.eia.gov/todayinenergy/detail.cfm?id=21772>
- ¹⁷ Pennsylvania Department of Labor & Industry, Marcellus Shale Update. [Online] Available at: <http://www.portal.state.pa.us/portal/server.pt?open=514&objID=1222103&mode=2>
- ¹⁸ Pennsylvania Department of Labor & Industry, Marcellus Shale Fast Facts, July 2012 Edition. [Online] Available at: http://www.marcellus.psu.edu/resources/PDFs/July2012_FastFacts.pdf
- ¹⁹ Multi-State Shale Research Collaborative, November 2013, Exaggerating the Employment Impacts of Shale Drilling: How and Why. [Online] Available at: <https://pennbpc.org/sites/pennbpc.org/files/MSSRC-Employment-Impact-11-21-2013.pdf>
- ²⁰ Autumn Stament 2013. [Online] Available at: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/263942/35062_Autumn_Statement_2013.pdf
- ²¹ EEF, The manufacturers' organisation, UK Shale Gas: The Manufacturer's View, November 2014. [Online] Available at: <https://www.eef.org.uk/resources-and-knowledge/research-and-intelligence/industry-reports/uk-shale-gas-the-manufacturers-view>
- ²² American Chemistry Council, Fuelling Export Growth: U.S. Net Export Trade Forecast for Key Chemistries to 2030. [Online] Available at: <http://www.americanchemistry.com/Policy/Trade/Fueling-Export-Growth-US-Net-Export-Trade-Forecast-for-Key-Chemistries-to-2030.pdf>
- ²³ The University of Michigan, Shale Gas: A Game-Changer for U.S. Manufacturing. [Online] Available at: <http://energy.umich.edu/sites/default/files/PDF%20Shale%20Gas%20FINAL%20web%20version.pdf>
- ²⁴ CF, Helping to feed the world, reliably and responsibly. [Online] Available at: <http://www.cfindustries.com/pdf/CF-Corporate-Sustainability-Report-2012.pdf>

-
- ²⁵ Rumbach, Andrew, Natural gas drilling in the Marcellus shale: Potential impacts on the tourism economy of the southern tier. [Online] Available at: <http://citizenshale.org/2011/08/natural-gas-drilling-in-the-marcellus-shale-potential-impacts-on-the-tourism-economy-of-the-southern-tier/>
- ²⁶ The Housing Market Impacts of Shale Gas Development. Muehlenbachs, L. and Spiller, E. and Timmins, C. s.l. : NBER working paper 19796, 2014.
- ²⁷ Lechtenböhmer, S., Altmann, M., Capito, S., Matra, Z., Weindorf, W. & Zittel, W. Impacts of shale gas and shale oil extraction on the environment and on human health. s.l. : European Parliament, 2012.
- ²⁸ UKOOG Community Engagement Charter on Oil and Gas from Unconventional Reservoirs. [Online] Available at: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/256360/Publication_UKOOG_communityengagementcharterversion6.pdf
- ²⁹ Local councils to receive millions in business rates from shale gas developments, January 2014. [Online] Available at: <https://www.gov.uk/government/news/local-councils-to-receive-millions-in-business-rates-from-shale-gas-developments>
- ³⁰ Autumn Statement 2014. [Online] Available at: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/382327/44695_Accessible.pdf
- ³¹ INEOS plans £2.5 billion shale gas giveaway. [Online] Available at: <http://www.ineos.com/news/ineos-group/ineos-plans-25-billion-shale-gas-giveaway>
- ³² Carsphairn: Community Benefits: Case Study. [Online] Available at: <http://www.localenergyscotland.org/media/46937/Carsphairn-Community-Benefit-Study.pdf>
- ³³ Strathnairn: Community Benefits: Case Study. [Online] Available at: <http://www.localenergyscotland.org/media/25262/strathnairn-case-study.pdf>
- ³⁴ Renewable UK, A Community Commitment: The Benefits of Onshore Wind, February 2011. [Online] Available at: <http://www.renewableuk.com/en/publications/reports.cfm/community-benefits-report>

Task Force on Shale Gas

Secretariat and Registered Office: 3rd Floor, Southside, 105 Victoria Street, London SW1E 6QT
Telephone: +44 (0) 203 047 2181 Press Enquiries: media@shaletaskforce.uk Email: secretariat@shaletaskforce.uk

Copyright ©2015 Task Force on Shale Gas. All Rights Reserved.